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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/786,106

02/26/2004

Shohei Hata

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EXAMINER

DOLAN, JENNIFER M

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 02/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/786,106	HATA ET AL.	
	Examiner	Art Unit	
	Jennifer M. Dolan	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) 7-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5 and 6 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/26/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I: claims 1-6 in the reply filed on 10/21/05 is acknowledged. Claims 7-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 3, and 6 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Publication No. 2003/0175530 to Ko et al.

Ko discloses an anodic bonding method comprising the steps of: forming a soft metal layer (Au layer) on a Si (43), and forming an active metal layer (Cr layer, which has a higher activity with oxygen than the Au layer) on the soft metal layer (paragraph 0016, 0041-0042, wherein either layer 41 or 42 can be taken as the Au/Cr stack), heating the active metal layer and the glass layer (glass substrate + dielectric layer – see paragraph 0042; additionally all dielectric

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silica layers can be considered glass layers – see paragraph 0048) that are brought into contact with each other while applying a DC voltage, using the Si as the anode and the glass as the cathode, thereby bonding the glass layer to the Si (see paragraphs 0005, 0022-0023, 0044-0046).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al. in view of U.S. Patent No. 4,712,082 to Ito et al.

Ko fails to suggest roughening the bonded face of the glass.

Ito teaches that a higher bonding strength can be achieved with some small amount of surface roughening of the glass layer when performing anodic bonding (see figure 3 – maximum bonding strength is achieved for a surface roughness of around 0.02-0.04 μm Ra; also see column 3, lines 40-50).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the anodic bonding method of Ko, such that a small amount of surface roughness is applied to the bonding surface of the glass layer, as suggested by Ito. The rationale is as follows: A person having ordinary skill in the art would have been motivated to apply some small amount of surface roughness to the glass layer in Ko, because doing so improves the

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strength and integrity of the anodic bond (see Ito, column 3, lines 40-50; figure 3), thereby decreasing any probability of delamination or separation of the anodically bonded layers.

Allowable Subject Matter

6. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for allowability is that claim 4 requires the inclusion of two additional metal layers: a metal layer between the conductor or semiconductor layer to improve adhesion of the soft metal layer, and another metal film between the soft and active metal layers to prevent diffusion and reaction therebetween.

US 6,939,778 to Harpster et al. suggests using a Ti layer between the substrate and the soft metal layer, but then uses the soft metal layer as the layer anodically bonded to the glass layer. There is no motivation provided in Harpster, Ko, or any other prior art of record for using a stack including the adhesion layer, the soft layer, and the active layer as claimed. Furthermore, the prior art does not provide any suggestion of including a layer between the soft and active metal layers that would be capable of preventing diffusion or reaction therebetween, nor does the prior art provide any suggestion that such a layer would be in any way desirable. Thus, it is the Examiner's opinion that a person having ordinary skill in the art would not find any motivation for using the claimed metal layer interface in an anodic bonding process.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. US 2005/0089924 to Ho et al. discloses anodic bonding between Si and glass layers using a Au/Cr interface.
- b. US 6,417,478 to Shiraishi et al. discloses general information on using a metal interface between a Si layer and a glass layer when performing anodic bonding.
- c. US 5,313,832 to Stephan et al. discloses a Si/Al/glass anodic bonding process.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
Art Unit 2813

jmd


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
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